WHAT IS CLAIMED IS:

Sub A1 1. A method of fabricating an integrated circuit, the method comprising:

forming a barrier material layer along lateral side walls and a bottom of a via, the via electrically connecting a first conductive layer and a second conductive layer; and

implanting a metal into the barrier material layer, the implanted metal making the barrier material layer more resistant to copper diffusion.

2. The method of claim 1, wherein the implanted metal is selected from a group of metals which upon implanting make the barrier material layer amorphous.

Sub A2 3. The method of claim 1, wherein implanting a metal into the barrier material layer includes implanting a low dose of the metal.

4. The method of claim 1, wherein implanting a metal into the barrier material layer includes implanting the metal at an angle.

5. The method of claim 4, wherein implanting a metal at an angle includes providing an implant that makes lateral side walls of the via amorphous and resistant to copper diffusion.

6. The method of claim 1, wherein the implanted metal is selected from a group consisting of Hafnium (Hf), Lanthanum (La), Barium (Ba), Tin (Sn), and Zinc (Zn).

7. The method of claim 1, wherein the implanted metal is selected from a group of heavy metals.

8. The method of claim 1, wherein the barrier material layer has a size of a thickness of between 10 and 300 Angstroms.

9. The method of claim 1, wherein the implanted metal forms an intermettallic with the second conductive layer, the second conductive layer including copper.

Sub A3

10. A method of implanting copper barrier material to improve electrical performance in an integrated circuit fabrication process, the method comprising:

providing a copper layer over an integrated circuit substrate;

providing a barrier material at a bottom and sides of a via positioned over the copper layer to form a barrier material layer separating the via from the copper layer;

amorphizing the barrier material layer, thereby making the barrier material layer more resistant to copper diffusion from the copper layer; and

providing a conductive layer over the via such that the via electrically connects the conductive layer to the copper layer.

11. The method of claim 10, wherein the amorphizing step includes implanting a low dose metal species.

12. The method of claim 10, wherein the amorphizing step includes implanting a metal species into the barrier material layer at an angle.

Sub A4

13. The method of claim 10, wherein the metal species is selected from a group consisting of Hafnium (Hf), Lanthanum (La), Barium (Ba), Tin (Sn), and Zinc (Zn).

14. The method of claim 10, wherein the barrier material layer is Tantalum (Ta), Titanium Nitride (TiN), Titanium Silicon Nitride (TiSiN) or Tungsten Nitride (WNx).

sub A5

15. A method of forming a via in an integrated circuit, the method comprising:

depositing a copper layer;

depositing an etch stop layer over the copper layer;

depositing an insulating layer over the etch stop layer;

forming an aperture in the insulating layer and the etch stop layer;

providing a barrier material at a bottom and sides of the aperture form a barrier material layer providing separation from the copper layer;

implanting a metal species into the barrier material layer, the implanted metal species making the barrier material layer more resistant to copper diffusion from the copper layer;

filling the aperture with a via material to form a via; and

providing a conductive layer over the via such that the via electrically connects the conductive layer to the copper layer.

16. The method of claim 15, wherein implanting a metal species into the barrier material layer includes implanting a low dose of the metal.

17. The method of claim 15, wherein implanting a metal species into the barrier material layer includes implanting the metal at an angle.

18. The method of claim 15, wherein the metal species is implanted at a dose of $2e^{14}$ to $2e^{15}/cm^2$ at an energy of 0.5 to 5 keV.

19. The method of claim 15, wherein the barrier material layer and the copper layer form an intermettallic.

20. The method of claim 15, wherein the implanted metal species is selected from a group of heavy metals.